DOCUMENT RESUME

ED 360 954 IR 016 183

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TITLE Computers in Education: A Survey of Computer Technology in the Westchester/Putnam Schools.
INSTITUTION Westchester Education Coalition, Inc., White Plains, NY.
PUB DATE Jun 93
NOTE 28p.
AVAILABLE FROM Westchester Education Coalition, Inc., 222 Bloomingdale Road, White Plains, NY 10605 ($5).
PUB TYPE Reports - Descriptive (141) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; Educational Planning; *Educational Technology; *Elementary School Teachers; Futures (of Society); Interviews; Mail Surveys; Microcomputers; *Public Schools; Questionnaires; *School Districts; School Surveys; *Secondary School Teachers; Superintendents; Tables (Data); Telecommunications; Use Studies
IDENTIFIERS *Access to Computers; Apple (Computer); Apple Macintosh; IBM Personal Computer; New York (Putnam County); New York (Westchester County)

ABSTRACT

The Westchester Education Coalition, Inc., a coalition of business, education, and the community, surveyed the state of education in the schools of Westchester and Putnam counties (New York) to establish baseline data in the region and to suggest some future directions. In January 1992, a questionnaire was sent to all of the school districts of the county; and the responses were supplemented by interviews with 13 superintendents, faculty, or staff members. The mean student/computer ratio for all districts was 10.03, compared to 1 computer for 17 students statewide. The size of the district had little effect on the number of computers available, but the greatest numbers of computers and the most modern equipment seem to be at the high school level. Apple computers appear to predominate at the lower levels, with IBM and Macintosh more common at higher levels. Districts are making specific plans to purchase new computers for use in a number of disciplines, and they recognize the need for telecommunications. Plans for the future must focus on quality of technology as well as quantity. Eleven tables and nine figures present study data. (Contains 6 references.) (SLD)

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Computers In Education

A Survey of Computer Technology in the Westchester/ Putnam Schools

Westchester Education Coalition, Inc.

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June 1993

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COMPUTERS
IN EDUCATION

A Survey of Computer Technology in the Westchester/Putnam Schools

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Districts are examining what they presently have and what they need.

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While all the districts have recognized the need for teacher training, most of that training has not been designed specifically by and for the individual district.

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Westchester/Putnam has made a good start but, even with the available technology, much more could be done. Advanced technology holds the promise of change in the way in which children are taught.

INTRODUCTION

There has been a great deal of interest in New York State in increasing the effective use of technology in the public schools. In 1990 the State proposed a telecommunications network, the *Long-Range Plan for Technology in Elementary and Secondary Education in New York State* (the Technology Network Ties), which would link every public school in the state. While that network has not been realized, the strong interest in technology continues.

The New York State Board of Regents recently approved a new plan, called *A Strategic Plan to Implement a New Compact for Learning.* This plan details a series of objectives and strategies to increase student learning, and technology serves a central role in many of these strategies. One of the objectives of the Compact states that **Schools will enable all students to take advantage of the opportunities afforded by the new technologies to use various technologies as an integral part of learning experiences in and outside of classrooms....**

As is evident from the various state mandates, the school districts have been spending moneys to achieve these educational technology goals. However, it has also been evident for some time that installing computers in the schools does not guarantee that they have been used in the most effective and most efficient ways. In 1991, the Public Policy Institute of New York State, a research and educational organization affiliated with the Business Council of New York, examined the condition of technology in the schools and published a special report entitled **Technology in New York's Classrooms.** Building upon the impetus begun in that "Special Report," the Westchester Education Coalition, Inc., a coalition of business, education and the community, made a decision to survey the state of technology in Westchester/Putnam classrooms in order to continue to assess what is happening with technology in schools. This study attempts to establish baseline data in the local region and to suggest some possible future direction.

Westchester and Putnam schools have recognized the need for the incorporation of technology for some time, and have been in the forefront of developing strategies for the use of technology in learning. There has been an impressive record of growth in hardware availability, both nationally and in the immediate region. Between 1981 and 1987, the percentage of Ameri-

can schools with one or more computers intended for instruction grew from about 18 percent to 95 percent, and by 1988, there were between 1.2 and 1.7 million computers in the public schools. In New York State, statistics show a dramatic increase, with 41.3% of students using microcomputers regularly in 1984, and by 1988, 66% using them regularly. This usage of computer technology is not constrained by grade level. By 1988, 34.5% of the elementary students, 43.4% of the Junior High students and 53.1% of the Senior High School students were in rooms where there was at least one computer per 30 students. By all indications, there is a widespread willingness on the part of school districts to incorporate technology into their teaching.

There is, however, a need to go beyond the students per computer ratio and to look at the ways in which the computer is actually being used to promote learning. In addition, there is a need to look ahead, both in terms of equipment and of training and support, to provide a rational plan for progress in a rapidly changing environment.

This study presents a compilation and analysis of data relating to the use of technology in education in the local area. It will assess the current status and future plans and needs of the districts, and address five basic questions as follows:

I What is presently available in terms of hardware? Where is it located?

II What are the future plans regarding hardware?

III How are computers being used in the classroom?

IV How are teachers being trained to use this technology?

V What are some of the future plans for usage?

Districts have been surveyed to assess what technology they have and what they are doing with it. Some opportunities for improvement have been identified, as well as some common needs. It is hoped this will provide a focus for future cooperative efforts.

METHODS

In January, 1992, a questionnaire was sent to all of the school districts in Westchester and Putnam Counties. This initial questionnaire was in two parts, the first of which was to be filled in by the Technology Coordinator in each district. This portion consisted of straightforward data

such as number of students, number of computers, etc. The second portion of the questionnaire dealt with utilization of the computers and with future plans. This was followed by a series of interviews with district superintendents, faculty and/or staff members of the districts who were designated by the school districts as knowledgeable about the computer situation. Interviews were conducted with a total of 13 such people.

After collecting all the data, each school district was assigned a code and the student/computer ratio was calculated using the October 1992 enrollment figures for the districts. In examining the data following these interviews, it was obvious that there were a number of discrepancies between the original questionnaires and the interviews. In an effort to clarify these discrepancies, the original data were codified and listed on a spread sheet, and this information was sent back to each of the districts for verification. A few questions were also added that had emerged as a result of examining the original data. This second mailing went out in November, 1992. Districts that had not returned the original questionnaire were also sent this packet, and by the end of January 1993, all the districts in the area had responded. Many districts did not answer every question, leading to occasional differences in totals in the data analysis.

FINDINGS

What is presently available in terms of hardware? Where is it located?

Westchester and Putnam Counties compare favorably with the rest of the country in the amount of computer hardware available for student use. In order for computers to be used effectively, there have to be a sufficient number available to students to make this a viable tool. If there is not a sufficient number, they cannot be used effectively in instruction. In order to determine the numbers of computers available, the total enrollment reported by the districts was broken down by level (elementary, middle, and high school) and the student/computer ratio calculated for each (Table 1). To some extent, this is an artificial comparison since there are many different grade level configurations, such as middle schools with sixth through eighth grades or seventh through ninth, as well as high schools which have grades six through twelve in the same building using the same computers.

Nevertheless, this comparison gives a good general picture of the state of computer usage in Westchester/Putnam today. The mean student/computer ratio for all districts is 10.03, compared to a 1991 figure in New York State of approximately one computer for each 17 students and a nationwide figure of about one for each 30 students. In Table 2, both mean and median are given for each level, since the median may give a more accurate picture in view of the numbers of computers in some of the largest districts. The standard deviation indicates that, although the ratio looks promising, there is actually a wide disparity in the number of computers to be found in any particular school.

The size of the district has little effect on the amount of computer hardware available, although distinctions by grade level are seen. In light of the interest on the part of the state in consolidating small schools into larger districts, it is appropriate to ask whether the size of the district has any impact in terms of available computers. The numbers of districts in each size category are listed in Table 3. Special Act School Districts may have both elementary and secondary schools but these have been placed in a separate category labeled "Special Districts." An examination of Figures 1 - 5 leads to the conclusion that there is no influence based on the size of the district. This conflicts with the conclusion drawn nationally in **Technology and Learning (February, 1993)** which observes that "It's important to remember that large and medium districts are traditionally further along in adoption of technologies than the average small suburban or rural district." In Westchester-Putnam schools, students in the small suburban districts are not being short-changed in comparison to the larger districts in terms of computer availability.

The greatest number of computers and the most modern equipment seem to be at the high school level. As would be expected, the average student/computer ratio is lower at the high school level (8.88 students/computer) than at the middle or elementary school level. In addition, the range (3.91-18.15) is much narrower at the high school level than at the other levels, probably reflecting a general agreement on the value of computers for older students. An examination of the distribution of brands by school level, shown in Figure 6, indicates that the greatest

number of IBM computers is at the high school level, with the greatest number of Apple computers at the elementary schools. The current distribution of computers by brand is shown in Figure 7. Although the data are not conclusive, there is an indication that many of the computers being used at the elementary level are the older Apple II computers, while the newer IBM and Macintosh computers are being placed at the higher levels. It is possible that many districts equipped their schools with Apple II computer labs over five years ago and have not had funds available since then for any hardware purchases. In fact, the average age of the computers in the districts is close to five years, with IBM computers having a slight edge in recent purchases. This supports the premise that the older Apple computers are being passed down to the elementary level.

Table 4 compares the age of the computers by brand, and Figure 8 compares the distribution of brands indicated for future purchases. An examination of the latter Figure indicates that many more of the districts, when funds are available, intend to purchase IBM equipment. About 95% of the districts report plans to network some portion of new purchases. The nationwide trend shows that in 1992, the Mac installed base moved up from 4% to 17%; the IBM installed base increased from 17% to 22%; and the overall MS-DOS installed base moved from 28% to 34% ("Update," 1993, p. 29). Nationwide as well, the older Apple II's are being "passed down" to lower grades. Further evidence of this can be found in Table 5, which shows the purchase plans nationwide for last year and for this year ("Update," 1993, p. 30).

What are the future plans regarding hardware?

Districts are making specific plans to purchase new computers. Table 6 indicates that most of the districts plan to purchase computers during the next five years. Interestingly, of the 17 districts which plan to purchase computers within the next two years, 8 (47%) have above-median student/computer ratios. When asked whether a long-range plan for implementation existed, 28 districts (62%) noted having such plans. In a follow-up question about the number of years it would take to fully implement such plans, the average time is five years, with a range from two to ten years. In this same follow-up question, 29 districts, and not necessarily the same districts as those which mention having plans, give specific numbers of years in which they

would like to implement acquisition plans. This probably reflects budget uncertainties.

One of the limiting factors in the use of computers, beyond teaching programming and using commercial packages, is the technology itself. The older computers in the schools are able to deliver text, graphics, and simple animation. More recent computers can be linked to videodisk players and CD-ROM players, cameras, and scanners to produce an interactive multimedia instrument. There is a great deal of interest in the area in incorporating more multimedia in the educational program. One indication of the degree of modernization is the quantity of new types of hardware presently being installed, specifically CD-ROM and laser disk players. Nationally, the growth in usage for videodisk players from 1991 to 1992 is about 200%, while the growth in CD-ROM players is over 300% for the same time period ("Update," 1993, p. 32). This is probably caused in part by the steep price decline in CD-ROM players as well as the perception that eventually CD-ROM players will be able to deliver full-motion video at a reasonable cost, obviating the need for videodisk players. In Westchester/Putnam, 45 of the 51 responding districts have some type of advanced device (Table 7) and ten of these districts have videodisk players only. An examination of the data shows no effects based on district size.

There is both an interest and a need for telecommunications. Providing teachers with access to telecommunications - computers, modems, and telephone lines - gives them access to a wealth of information outside of the immediate classroom. Teachers can use the networks to access information ranging from weather reports in other parts of the country to the latest in educational research. The use of telecommunications is generally regarded as indicative of a longer involvement with computers. In February, 1993, the Center for Technology in Education in the Bank Street College of Education conducted a survey of K-12 teachers who use telecommunications and found that 80% of their respondents had been using computers in their teaching for more than five years. The growth of telecommunications in schools nationwide for the past year has been running at approximately 50%, according to a survey in Technology and Learning. In the local region, 33 districts own modems.

How are computers being used in the classroom?

While the student/computer ratio gives a general picture of technology in the schools, only in the last few years have computers begun to be integrated into regular classroom work and much of that integration is in the nature of commercial packages which address a specific need, particularly at the elementary level. For the purpose of this survey, we have consolidated all of the commercial packages aimed at specific content areas under the title of "Computer-Aided Instruction Packages." Many of these are excellent interactive software, but the degree of interaction varies dramatically and becomes difficult to categorize. We have also labeled programs used to instruct the entire class at one time in a single subject area, such as those used primarily in mathematics, as "Computer-Managed Instruction Packages." Table 8 indicates the software utilization by school level. As expected, the teaching of programming increases in the higher grades, as does the use of application packages and of hypermedia packages. In the eight years since the National Assessment of Educational Progress examined computer usage in the public schools, there has been a dramatic shift in use. In that 1985-86 survey, computers in schools were being used almost exclusively to teach about computers, rather than being used in other subject areas. The data indicate that this is no longer the case in the Westchester/Putnam region.

This survey was unable to define the curriculum areas in which schools are most likely to be using technology. However, a recent nation-wide survey conducted by Quality Education Data (cited in "Update," 1993), indicates that, while math was the most popular subject area for computer software purchases, and still remains slightly ahead, educators are now purchasing software for all curriculum areas (see Table 9).

How are teachers being trained to use this technology?

Nationally, a review of the past five years reveals that districts are taking training much more seriously now than they have done in the past. Five years ago, 42% of the nation's districts had no plans for training the teachers. That figure has dropped to 10%. In Westchester/Putnam, all of the districts recognize the need for teacher training in technology. In a listing of needs, the districts place teacher training first (Table 10), ahead of hardware or software acquisition. The

question that arises is: How and what do the districts want these teachers to be trained to do?

In looking at the training done previously by the districts, eight of 32 report that there has been no training done specifically by their district, and three more report relying exclusively on the Teacher Centers to decide what training needs to be done and having the Teacher Centers offer all the training. Of those that have done specific training in technology, only three mention training in integrating software into the curriculum. When looking toward the future, however, there is a recognition that, in Westchester as well as nationwide, training has become a major priority. An examination of Table 11 shows that 96% of the districts want their teachers trained to integrate computers into the curriculum. Another 91% mention training the teachers to use some type of application package in the classroom. The training needs that the districts note reflect future acquisition plans as well as present priorities, as noted by the fact that, while 64% of the districts want training in hypermedia, only 51% actually use it at present.

In looking at where the training presently takes place and where the districts envision future training, it is obvious that multiple training environments are being used simultaneously. The districts report that 64% of their teachers have had some type of in-class teacher training. Seventy-five percent have had some other form of on-site training and 89% have learned off-site. The locations of the off-site training show an enormous reliance on self-training with little district support. It is also unlikely that the district computer coordinators have had time to do much of the teacher training. While 87% of the districts have someone designated as "computer coordinator," 79% of those have other duties in addition to being coordinator.

The locations where districts expect future training show little percentage differences between present and future in regard to on-site training, but they show a large difference in location of off-site training, as shown in Figure 9. This suggests that districts now recognize the need to become more involved in promoting and designing the training. This conclusion is further supported by the fact that more than half of the districts that accord a high priority to obtaining technology training for teachers also accord a high priority to being able to provide released time for the teachers to be trained.

What are some of the future plans for usage?

In its 1988 report entitled *Power on!: New Tools for Teaching and Learning*, the U.S. Office of Technology Assessment concluded that there is no single best use of technology, and listed a number of basic educational uses which have already proven valuable. These applications include the following:

> **Writing skills development** - Including not only word processing but also programs such as the IBM Writing to Read and Writing to Write as a supplement to writing instruction has allowed both mainstream and special students to make significant gains in writing ability.

> **Problem solving** - Using many of the computer simulations and games which require breaking problems down into discrete entities and the use of higher order thinking skills, teachers have been able to improve students' analysis and solution strategy abilities.

> **Abstract mathematics and science concepts** - Innovative software and real-time probes let students experiment with and visually graph abstract concepts. Microcomputer-based laboratories foster a deeper understanding of complex scientific concepts. The computer has become an invaluable tool for teaching graphing concepts.

> **Manipulation of data, models and simulations** - Using database management systems to teach students to break information into its components, understand the relevant parts, and sort and select information, allows them to substantially improve information processing and communication skills in science, mathematics, social studies and language arts. Activities that are simply not feasible or too dangerous in the classroom can be simulated to successfully engage students' thought processes.

> **Access in remote locations** - Through the use of telecommunications in various forms, a new freedom has been created. Students can communicate, and be communicated with, outside the traditional classroom walls in a number of ways, removing limitations and opening up a host of learning opportunities.

> **Individualized learning** - Computers are used to interactively adapt the classroom environment to each individual student's prior knowledge and rate of learning, and can both

manage and document student performance.

> **Cooperative learning** - Both within the classroom and, through telecommunications, across distances, students can gather and process information from many sources. Mixed ability grouping and teaming facilitate task performance that would otherwise not be possible.

> **Multimedia** - Students can be engaged on many levels and across many disciplines, using the exciting possibilities afforded by modern multimedia hardware and software.

While the data show that the Westchester-Putnam area compares favorably in many respects with national, state and New York City data, it is clear that hardware alone is only a necessary prerequisite. To increase the effective use of technology, appropriate software, training and support are required, and area schools currently appear to recognize this. Teacher motivation and assistance remain key factors for successful integration of modern tools into the curriculum.

In carrying out this survey, we found that, although there are individual schools that have made a beginning, no one single district has a majority of its classroom teachers using technology in any comprehensive way. Districts that have a substantial number of computers have had those computers, in most cases, for just two to three years. Training the teachers to use computers in some of the ways listed above has only begun. There are many individual teachers doing exciting projects involving computers. There are individual schools that have begun some comprehensive training. Too often, however, present classroom use is highly dependent on individual teachers who have the interest and the commitment to work on their own.

The first step in using computer technology in the classroom is making the hardware available and that first step has been taken by many of the districts. The next step is helping the classroom teacher become sufficiently comfortable to be able to use the technology without great effort and that degree of comfort is neither quickly nor easily realized. Only after the teachers have been trained and have spent time experimenting on their own can we begin to effectively integrate technology within the curriculum.

While this survey has concentrated on the state-of-the-art in computer usage in this region, it is obvious that for the future, we need to focus on both the quality as well as the quantity of our technology. Hardly any of the districts come near the optimum four students per computer recommended in the Public Policy Institute report, and all need both more computers and more training. The hardware to be purchased in the future will need to be modern enough for the advanced technologies and software, and the teachers will need to be trained well enough to be able to continue to cope as the technology continues to advance. At present, the training of the teachers may actually be more necessary than additional hardware and will certainly be cost-effective. If some additional training is done prior to the purchase of more advanced technology, the trained teachers will have a greater sense of what their eventual hardware and software needs will be.

Technology is a powerful vehicle for communication, for collaboration, for analysis and for the movement of information from place to place. Future decisions will need to be made to define how technology can best be used to aid schools in accomplishing their tasks. It is hoped that this survey will provide baseline data on the degree and the areas in which technology is influencing education, as well as help to focus attention on the directions to be taken.

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Table 1

Student to Computer Ratios

School Code	Total Enrollment	#Students/ Computer	#Students/ ES Computer	#Students/ MS Computer	#Students/ HS Computer
41	247	7.06	7.06		
2	751	9.63	8.33	61.00	7.62
53	320	8.00	8.00		
3	530	6.46	11.67		3.91
4	842	9.68	9.48		6.00
5	930	10.45	14.00		7.55
6	950	7.36	6.09	7.93	10.50
8	1037	18.52	57.75		12.23
7	1025	6.49	7.21		5.79
9	1028	12.85	16.13	16.00	8.69
45	1051	8.28	10.00	20.00	4.00
36	1050	12.21	21.00	3.21	3.99
46	1105	6.46	9.24	3.82	6.18
11	1184	11.50	17.00	8.41	8.63
42	1180	13.72	15.92	10.81	
10	1200	9.60	12.00	6.58	9.46
39	1230	9.69	10.68	10.43	8.28
34	1355	6.84	5.06		12.42
13	1592	8.80	9.15	8.53	8.49
12	1569	14.80	22.43	12.61	11.05
14	1821	13.80	19.74	11.52	11.05
15	1694	7.27	8.01	7.60	5.97
17	1795	9.50	12.26	11.81	5.99
16	1829	12.70	21.16	12.93	6.42
18	1944	8.27	9.80		6.83
19	2042	5.04	4.09	5.00	6.93
20	2215	9.76	10.38	7.10	11.94
21	2152	8.03	12.61	5.06	7.30
51	2357	6.22	6.85	4.77	6.09
23	2754	9.30	8.90	11.07	8.93
25	2785	13.72	14.37	12.85	13.73
26	2934	7.04	8.44	6.16	5.93
27	2988	9.67	9.47	10.41	8.04
24	2976	17.20	25.44	13.69	14.60
28	2987	13.22	18.61	9.43	10.36
1	3312	11.04	11.09	14.44	18.15
35	3646	13.02	14.70	10.13	13.63
29	3697	6.58	7.76	4.58	7.33
30	4045	7.85	8.82	8.66	6.42
31	4389	13.93	18.77	11.95	11.40
49	5205	9.99	11.29	8.93	8.81
48	5229	10.42	12.50	7.70	10.25
32	7289	8.99	8.01	8.07	15.09
55	9251	10.90	12.97	9.69	8.47
33	19500	9.31	14.84	5.07	8.79

Table 2

Students/ Computer Ratio Statistics

	#Students/ Computer	# ES Students/ Computer	#MS Students/ Computer	#HS Students/ Computer
Median	9.63	11.09	9.43	8.48
Mean	10.03	13.09	10.78	8.88
Std. Dev.	3.02	8.4	9.35	3.2
Range	5.04-18.52	4.09-57.75	3.21-61.00	3.91-18.15

Table 3

Size Distribution of Districts in Technology Survey

District Enrollment	Number of Districts
<1000	7
1000-1999	19
2000-5000	15
>5000	5
Special Act Districts	5
	51

Table 4

Computer Age Statistics by Brand

	IBM	Apple	Other
Median	5.0	5.5	5.75
Mean	4.87	5.81	6.29
Std. Deviation	2.81	2.05	2.48

Table 5

Nationwide Computer Purchase Plans By Brand

	last year	this year
Apple II	16%	5%
Mac	41%	43%
IBM	25%	26%
All MS-DOS	43%	51%

Table 6

Computer Purchase Plans -
Percent of Districts Planning Purchases in:

0-2 years	2-5 years	>5 years
17 districts	22 districts	6 districts
37.8%	48.9%	13.3%

Table 7

Distribution of Advanced Devices by District

School Code	#students/ computer	District Size	CD-ROM & laserdisks/	Scanners	Modems	#students device
50	3.39	Special	1	1	2	26.25
47	7.22	Special	1	0	0	130.00
40	10.71	Special	3	0	0	75.00
37	3.49	Special	5	2	3	27.20
38	4.13	Special	0	1	0	330.00
41	7.06	<1000	1	0	1	123.50
2	9.63	<1000	0	1	3	187.75
53	8.00	<1000	0	0	0	
3	6.46	<1000	5	1	3	58.89
4	9.68	<1000	0	0	1	842.00
5	10.45	<1000	5	0	0	186.00
6	7.36	<1000	2	1	3	158.33
8	18.52	1000-1999	0	0	0	
7	6.49	1000-1999	6	2	4	85.42
9	12.85	1000-1999	0	0	0	
45	8.28	1000-1999	4	0	0	262.75
36	12.21	1000-1999	2	0	2	262.50
46	6.46	1000-1999	0	0	0	
11	11.50	1000-1999	6	1	4	107.64
42	13.72	1000-1999	2	0	0	590.00
10	9.60	1000-1999	1	0	2	400.00
39	9.69	1000-1999	3	0	4	175.71
34	6.84	1000-1999	9	3	5	79.71
13	8.80	1000-1999	2	0	0	796.00
12	14.80	1000-1999	5	1	4	156.90
14	13.80	1000-1999	1	0	0	1821.00
15	7.27	1000-1999	2	1	7	169.40
17	9.50	1000-1999	5	3	0	224.38
16	12.70	1000-1999	0	0	0	
18	8.27	1000-1999	4	1	6	176.73
19	5.04	2000-5000	3	0	0	680.67
20	9.76	2000-5000	1	0	0	2215.00
21	8.03	2000-5000	18	0	0	119.56
51	6.22	2000-5000	3	0	6	261.89
23	9.30	2000-5000	13	3	30	59.87
25	13.72	2000-5000	2	1	3	464.17
26	7.04	2000-5000	0	2	10	244.50
27	9.67	2000-5000	4	1	2	426.86
24	17.20	2000-5000	6	1	4	270.55
28	13.22	2000-5000	5	2	5	248.92
1	11.04	2000-5000	3	1	10	236.57
35	13.02	2000-5000	6	1	6	280.46
29	6.58	2000-5000	10	1	57	54.37
30	7.85	2000-5000	8	1	2	367.73
31	13.93	2000-5000	7	0	3	438.90
49	9.99	>5000	4	5	18	192.78
48	9.99	>5000	16	8	20	118.84
32	8.99	>5000	15	0	7	331.32
55	10.90	>5000	4	2	22	330.39
33	9.31	>5000	30	10	50	216.67

Table 8

Software Utilization By School Level

	Computer-Aided Instruction Programs	Computer-Managed Instruction Programs	Programming Languages	Standard Application Packages	Hyper-Media Packages
Elementary Schools	91%	50%	33%	74%	30%
Middle Schools	78%	45%	44%	91%	40%
High Schools	60%	46%	85%	100%	56%

Table 9

Instructional Software Purchase Plans

By Subject Area

Math	27%	24%	17%	15%	14%
Language Arts	14%	18%	16%	12%	12%
Science	15%	16%	15%	12%	13%
Reading	10%	9%	12%	10%	10%
Social Studies	10%	8%	12%	11%	11%
Business	3%	3%	11%	10%	10%
	88-89	**89-90**	**90-91**	**91-92**	**92-93**

Percent of Responses

Table 10

Need Priorities

	Computer Acquisition	Software Acquisition	Teacher Training	Teacher Release	Other Hardware	Additional Coordinator	Other Needs
Replies	44	41	43	36	38	31	22
Median	2	4	1	3	4	6	5
Mean	2.48	3.56	1.91	3.25	3.76	5	4.68
Std. Dev.	1.44	1.4	1.27	1.38	1.63	2.24	1.99

Table 11

Type of Training Needed

Basic Literacy	Word Processing	Desktop Publishing	Data Base	Spreadsheet	Hypermedia
59%	69%	64%	51%	44%	64%

Laserdisk	Television	Using a Network	Integrating technology in the curriculum
76%	44%	73%	96%

Figure 1

District Enrollment <1000

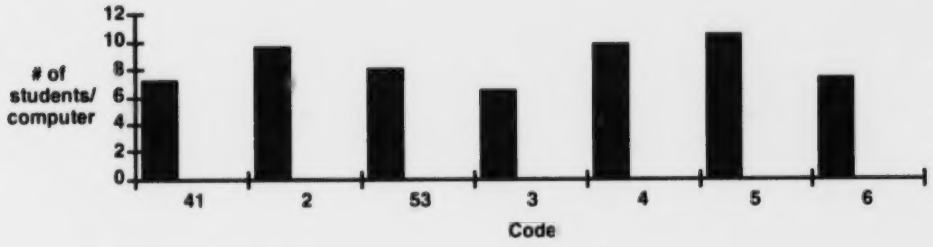


Figure 2

District Enrollment 1000 - 1999

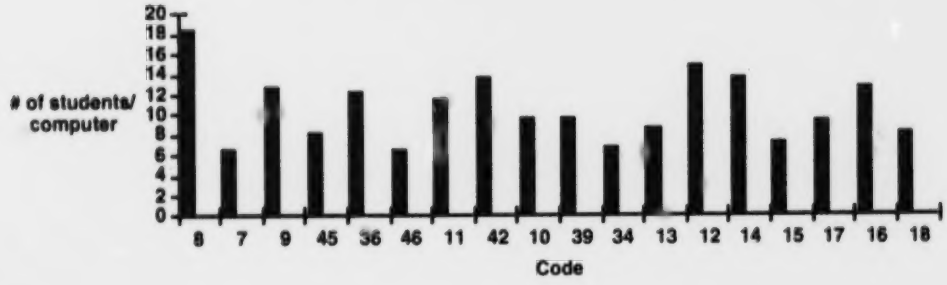


Figure 3

District Enrollment 2000 - 5000

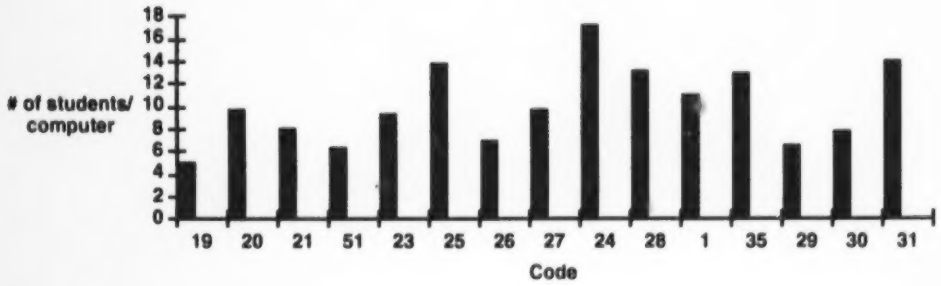


Figure 4

District Enrollment >5000

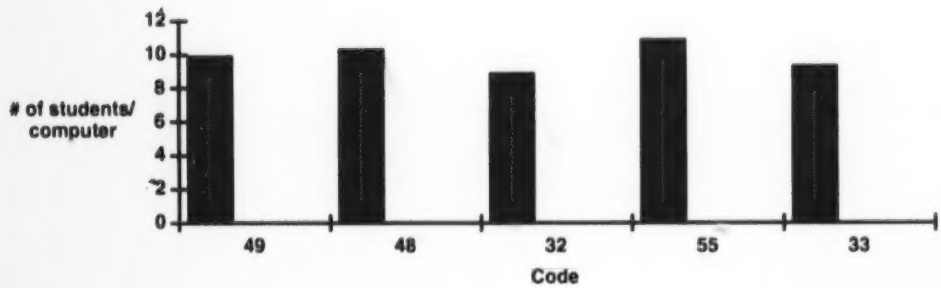


Figure 5

Special Districts

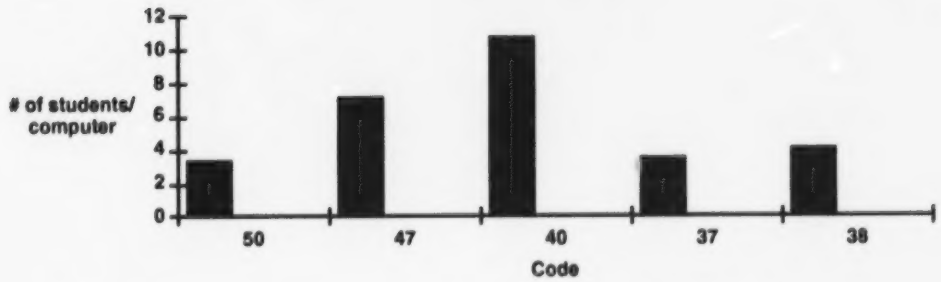


Figure 6

Distribution of Brands by School Level

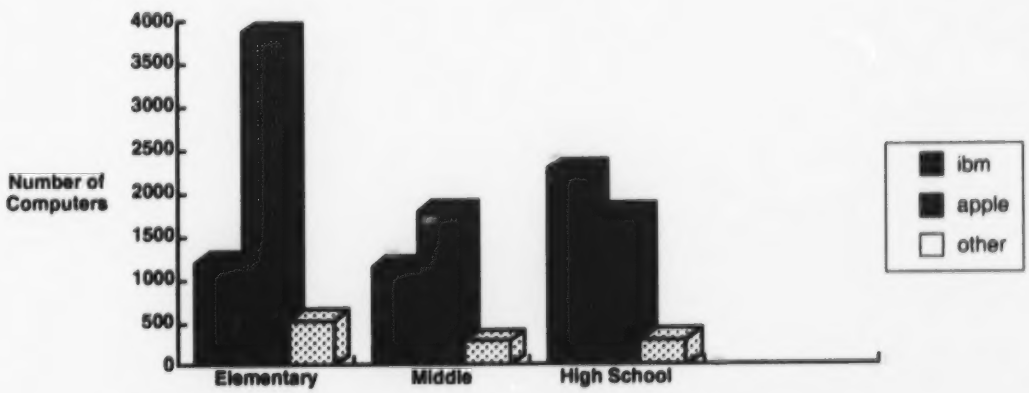


Figure 7
Distribution of Computers by Brand

Figure 8
Distribution of Intended Purchases by Brand

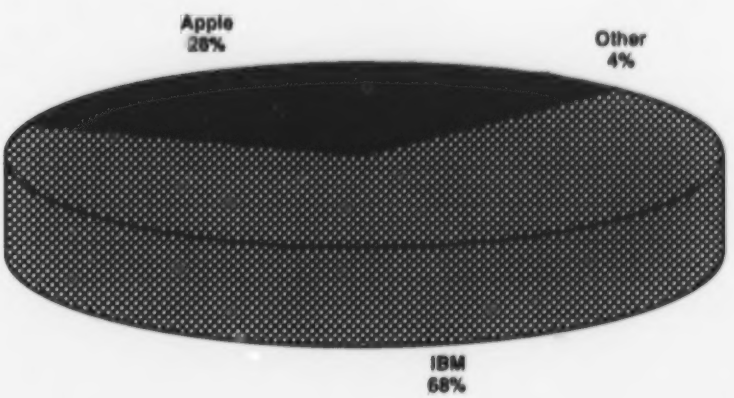


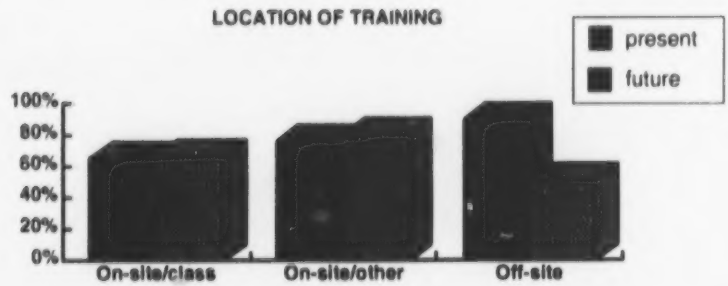
Figure 9

SITE OF PRESENT TEACHER TRAINING

On-site in class	On-site other	Off-site
64%	75%	89%

SITE OF FUTURE TEACHER TRAINING

On-site in class	On-site other	Off-site
66%	80%	51%



LOCATION OF PRESENT OFF-SITE TRAINING

Teachers Centers	College	BOCES	Summer Institute	Self-trained	At home with loan computer
44%	31%	62%	16%	69%	44%

We gratefully acknowledge the assistance provided by the 55 school districts in Westchester and Putnam counties in providing the data for this report, with special thanks to Superintendents Barry Farnham, Richard Hibschman, Donald Kusel, and Thomas Maguire.

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Printed By American Brands, Inc.
Old Greenwich, Connecticut

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